REMARKS

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Versions with Markings to Show Changes Made.**"

The present Preliminary Amendment is being submitted merely to correct typographical, grammatical and/or translation-related errors in the present application. Indeed, the present Amendment is intended for clarification purposes only and not for substantial reasons related to patentability pursuant to 35 U.S.C. §§ 101, 102, 103 or 112.

Early consideration on the merits is respectfully requested.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Paragraph 0004 has been amended as follows:

The inventors of the present invention have recognized that it is possible to compensate the short-term and small intensity fluctuations in a data transmission path which lead to a change in the tilting of the transmitted spectrum of the data signals in the data transmission path by virtue of the fact that one or more filling ~~full~~ lasers are used to compensate these intensity fluctuations immediately, and a "sneaking away" of ~~"compensation" for~~ this change by the filling ~~full~~ laser then takes place slowly in such a way that the existing slow compensation mechanisms of the tilting can be compensated. It is not necessary here for the original spectrum of the data signals to be retained, but rather it is sufficient if the overall intensity remains within a specific bandwidth of approximately 100 nm, and the full laser is maintained in this region, which can be located differently depending on the property of the fiber used. For this wavelength dependence, reference is made to M. Zirngibl, "Analytical model of Raman gain effects in massive wavelength division multiplexed transmission systems", Electron. Lett., Vol. 34, pp. 789-790, 1998.

Paragraph 0005 has been amended as follows:

In accordance with these inventive ideas described above, the inventors of the present invention propose to improve the known control method for compensating changes in the SRS-induced power exchange when connecting channels into, and disconnecting them from a continuous optical data transmission path of a WDM system by influencing the tilting of the spectrum, to the effect that the tilting is brought about via at least two systems which operate at different speeds. Therefore, ~~, with~~ at least one quicker system is measuring a change in the overall power in the optical data transmission path and compensating the tilting by changing the power of an injected filling ~~full~~ light source. Filling ~~Full~~ light source within the terms of the present invention is to be understood as any energy-supplying light source which amplifies an optical signal. In particular, this may be a filling ~~full~~ laser or a broadband light source, for example a white light source whose spectrum is, if appropriate, constricted by a filter.

Paragraph 0006 has been amended as follows:

In one particularly advantageous embodiment of the method of the present invention, a time delay is generated in the signal in the optical path between measurement of the overall power and injection of the filling ~~full~~ light source so that the reaction time between the measurement of the overall intensity and the response of the filling ~~full~~ light source is compensated.

Paragraph 0009 has been amended as follows:

The filling ~~full~~ laser can be injected at the start of the optical transmission path, or else at the end of the optical transmission path and injected counter to the direction of transmission.

Paragraph 0010 has been amended as follows:

It is particularly advantageous to use at least two filling ~~full~~ light sources or filling ~~full~~ lasers instead of one filling ~~full~~ light source or filling ~~full~~ laser. This makes it possible to compensate not only the tilting but also the change in the Raman gain averaged over all the signals.

Paragraph 0011 has been amended as follows:

If the entire bandwidth used exceeds 100 nm, it is necessary to ensure that the power remains constant in subbands which each have a bandwidth of less than 100 nm. To do this, a correspondingly larger number of filling ~~full~~ lasers must be used and the overall power per subband measured, it being possible to use monitor diodes which measure the power in one subband each. The subbands here must in total cover the entire wavelength range used. It is advantageous if the subbands overlap.

Paragraph 0013 has been amended as follows:

In accordance with the method described above, the inventors of the present invention also propose to supplement an optical data transmission path having a WDM system with a multiplicity of data transmission channels of different frequencies with at least one multiplexer, arranged at the beginning, for combining the data transmission channels, one demultiplexer arranged at the end, for separating the data transmission channels, and at least one path section,

arranged therebetween, having capabilities for determining and compensating the spectral tilting of transmitted data signals in such a way that provisions are made which are assigned to at least one path section for indirectly or directly measuring the overall intensity of the transmitted light signal, one or more controlled filling ~~full~~ light source or sources for injecting light power into at least one path section, and further provisions are made for controlling the power of the filling ~~full~~ laser in order to compensate power fluctuations of the overall intensity of the data signal.

Paragraph 0014 has been amended as follows:

Here, one advantageous embodiment includes arranging the provisions for indirectly or directly measuring the overall intensity of the transmitted light signal and the controlled filling ~~full~~ laser for injecting light power at the beginning of a path section, preferably at the beginning of the entire data transmission path.

Paragraph 0015 has been amended as follows:

Furthermore, it is possible for a delay element to be arranged between the provisions for measuring the overall intensity and the filling ~~full~~ light source or sources, which delay element may be, for example, a dispersion-compensating fiber (DCF) which is used in the data transmission path and in the booster.

Paragraph 0017 has been amended as follows:

In one further advantageous embodiment of the optical data transmission path according to the present invention, it is possible to provide for the at least one frequency of the filling ~~full~~ light source or of the filling ~~full~~ laser to be located within the transmitted wavelength band of the transmitted data signals. A filling ~~full~~ laser can preferably have a single frequency.

Paragraph 0025 has been amended as follows:

Figure 1 shows a schematic view of an embodiment of an optical data transmission path according to the teachings of the present invention. Here, a multiplicity of data transmission channels 1.1 to 1.4 are combined via a multiplexer 2. A constant extracted part of the overall intensity of the transmitted light power is then measured in a monitor 3 via a coupler 4. In accordance with the result of the intensity measurement, a filling ~~full~~ laser 6, which is operated at

a medium power level if no quick compensation measures are necessary, that is to say in the steady state, is controlled so as to perform initial compensation of the power fluctuations on the basis of the power fluctuations measured. The power of the filling ~~full~~ laser 6 is injected downstream of a time delay element 5 in the direction of transmission via a wavelength-selective coupler 7. This is then followed by a generally known path section 8 of a data transmission path with a tilting control via a power-controlled EDFA 8.1 and the transmission fiber 8.2 which spans the actual subsequent distances. A demultiplexer 9 finally separates the data transmission channels 10.1 to 10.4 which are converted into electrical signals with the receivers 11.1 to 11.4.

Paragraph 0026 has been amended as follows:

The control method for quickly compensating the changes in the SRS tilting proceeds as follows. It is assumed that the system is in the steady state and the filling ~~full~~ laser 6 is outputting a medium power P_0. At the output of the multiplexer 2 the overall power is measured in the monitor 3. If the measuring device detects a change in the overall power over time, the power of the filling ~~full~~ laser 6 is correspondingly increased or decreased so that the power at the input of the transmission path 8 remains constant. Because the control of the filling ~~full~~ laser 6 requires a certain amount of time, the signals are delayed by this time period by a delay element 5 after the detection of their overall power. For the delay which is necessary, it is possible, for example, to use in the transmission over standard fibers the dispersion-compensating fiber which is present in any case in the booster. Of course, the overall power also can be determined by measuring the output power of all the transmitters 12.1 to 12.4 upstream of the multiplexer 2 and adding them. In addition, the power which is output by the filling ~~full~~ laser also can be inserted at the end of a booster which is not explicitly illustrated here.

Paragraph 0027 has been amended as follows:

The wavelength of the filling ~~full~~ laser 6 is best selected here in such a way that it lies within the transmitted wavelength band. Here, use is made of the particular property of SRS that the tilting depends only on the overall power occurring within a wavelength range of approximately 100 nm, irrespective of how this overall power is distributed among the individual channels. For this reason, a filling ~~full~~ laser with a single wavelength is sufficient for the control purposes.

Paragraph 0029 has been amended as follows:

The slow control outputs to the N EDFA 8.1.1 to 8.1.N of the transmission path 8 control signals 15.1 to 15.N which predefine its tilting. At the same time, a setpoint signal 14.1 is generated for the quick control 14. If the signal 14.2 of the overall power measured via the monitor 3 then changes, this is first compensated by the quick control 14 by changing the power of the filling ~~full~~ laser via the actuation signal 14.3. The deviation from the setpoint value is, however, also reported to the slow controller 13 via the signal 14.4. The slow controller 13 then reacts by outputting, in small steps, commands to the EDFA 18.1.1 to 18.1.N to adapt the tilting, and at the same time adapting the setpoint value for the control via the line 14.5. This adaptation mechanism is continued until the output signal of the comparator 19 disappears. As a result, a new steady state is established in which the filling ~~full~~ laser outputs the medium power P_0 again.

Paragraph 0031 has been amended as follows:

Figure 3 shows different measurement and control values of the control according to the present invention as a functional profile coordinated chronologically over the same time axis. At the beginning, from t0 ~~to~~ to t1, and at the end, to the right of t2, of the time axis, the old and new steady states are shown with gray backgrounds. At the top, the variation over time of the overall power 20 measured at the monitor 3 in Figure 1 is represented, the overall power 20 rising at the end of the first gray area suddenly owing to the connection of the channels at the time t1. Below that, the value 21 of the signal 14.3 for actuating the filling ~~full~~ laser 6 is shown, and below that the profile of the value 22 of the setpoint value 14.1 of the quick control 14, and finally below that the magnitude of the value 23 of the control signal for tilting the EDFA 15.1 to 15.N from Figure 2 is plotted.

Paragraph 0033 has been amended as follows:

The integration of the quick control 14 into the slow control 13 serves to limit the value range of the output power of the filling ~~full~~ laser. In a WDM system with, for example, 80 channels in a wavelength band, the filling ~~full~~ laser would have to be capable of outputting an output power of up to 80 times the power of a channel. This then results in massive crosstalk problems at the demultiplexer 9, even if the filling ~~full~~ laser 6 has larger wavelength spacing with respect to the signal lasers 12.1 to 12.4 than they have with respect to one another. This is

the case, for example, if the filling ~~full~~ laser 6 is positioned in a band gap in which there are no signals for the purpose of subband dispersion compensation. On the other hand, if there is restriction to dealing only with the simultaneous failure of a small number of lasers, for example 16, the filling ~~full~~ laser 6 only has to be capable of outputting 16 times the power of a channel, and the crosstalk problems can be made negligible.

Paragraph 0035 has been amended as follows:

In the described form of the method of the present invention, it is necessary that the transmission path be transparent at the wavelength of the filling ~~full~~ laser. If this is not the case, further filling ~~full~~ lasers must be provided in each case downstream of the separation points which the optical data signal cannot pass and at which it is regenerated.

Paragraph 0036 has been amended as follows:

An alternative embodiment of a data transmission path according to the present invention is illustrated in Figure 4. In this case, the quick control is integrated into each of the boosters which are generally composed of a number of stages. In the present case it is assumed that there is a dispersion-compensating fiber (DCF) between the two amplifier stages illustrated. A change in the overall power is reacted to in that the power of the filling ~~full~~ laser which is injected contradirectionally into the DCF is appropriately adapted.

Paragraph 0037 has been amended as follows:

Figure 4 shows the basic design of an optical amplifier, which is typically composed of two amplifier stages 18 between which there is a fiber for dispersion compensation and the device for compensating the SRS. At the beginning, a constant part of the transmitted light power is extracted via a coupler 4, measured in a monitor 3, and the result is signaled to the controls 13/14. The controls 13/14 control, on the one hand, the slowly reacting influencing of the tilting via a controllable filter (gain tilt filter) 16 and, on the other hand, the filling ~~full~~ laser 6. The power of the filling ~~full~~ laser 6 is injected downstream of a dispersion-compensating fiber 17, counter to the direction of data transmission via a wavelength-selective coupler 7.

<u>In the Claims:</u>

Claim 1 has been amended as follows:

1. (Amended) A control method for compensating changes in an SRS-Induced Power Exchange when connecting channels into, and disconnecting channels from, a continuous optical data transmission path of a WDM system, the method comprising the steps of:

providing at least two systems which operate at different speeds to influence tilting of a spectrum of data signals in the optical data transmission path;

measuring a change in overall power in the optical data transmission path via at least one quicker system of the at least two systems; and

compensating the tilting by changing a power of at least one injected <u>filling</u> ~~full~~ light source via the at least one quicker system.

Claim 2 has been amended as follows:

2. (Amended) A control method for compensating changes in an SRS-Induced Power Exchange as claimed in Claim 1, the method further comprising the step of:

incorporating a time delay in the signal in the optical data transmission path between measurement of the overall power and injection of the at least one <u>filling</u> ~~full~~ light source.